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ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 09/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/993,715	KUDO ET AL.
	Examiner	Art Unit	
	Jason Proctor	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>06 July 2006</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>2,5-8,10,11,13,15,16,22,23,25 and 26</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>2,5-8,10,11,13,15,16,22,23,25 and 26</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>27 November 2001</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>3/23, 7/7, 7/28/06</u>.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

In the previous Office Action, claims 2, 5-8, 10, 11, 13, 15, 16, 18, 22, 23, 25, and 26 were rejected.

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6 July 2006 has been entered.

Applicants' submission on 6 July 2006 has amended claims 2, 5-8, 10, 11, 13, 22, 23, and 26; and cancelled claim 18.

Claims 2, 5-8, 10, 11, 13, 15, 16, 22, 23, 25, and 26 are pending in this application.

Claims 2, 5-8, 10, 11, 13, 15, 16, 22, 23, 25, and 26 are rejected.

Restriction/Election

1.   Applicant's election without traverse of Group I, claims 1-26 in the reply filed on 5 December 2005 is acknowledged.

Claim Objections

2.   The previous objection to claim 13 is withdrawn in response to Applicants' amendments to the claim.

3.   The previous objection to claim 18 is withdrawn in response to the cancellation of the

claim.

Claim Rejections - 35 USC § 112

4.   The previous rejections under 35 U.S.C. § 112, second paragraph, are withdrawn in

response to Applicants' remarks amendments to the claims.

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
> subject matter which the applicant regards as his invention.

5.   Claims 2, 5-8, and 10-11 are rejected under 35 U.S.C. § 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

Claim 2 recites "…storing in a computer information concerning structures of various

production facilities and physical distribution facilities **of an existing or newly established**

workshop having a portion or the whole that is newly designed" and also recites, "a workshop

development process of **constructing an actual workshop** including various facilities and

layouts compatible with the verified virtual workshop". Applicants' remarks submitted on 6 July

2006 state that, "In contrast, by way of non-limiting example, the claimed methods and systems

could eliminate the need for such a prototype, since the process is validated **prior to**

construction of the workshop, and the workshop is constructed in accordance with the verified

virtual workshop." All emphasis is added.

The proper interpretation of the scope of claim 2 is therefore indefinite. The claim apparently requires a **first** "existing or newly established workshop," and subsequently a **second** "actual workshop" is constructed. There appears to be no direct link between these recitations, except through the storing of information and the verifying process. Applicants' remarks, however, suggest that the **first** "existing or newly established workshop" is not required in order to perform the "virtual workshop verifying process". It is unclear whether this argument is clearly refuted by the claim language or whether the form of the claim obscures Applicants' intended scope of invention. Regardless, the claim is indefinite under 35 U.S.C. § 112, second paragraph.

6.   Claim 6 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites "wherein the simulating means simulates the production state and the physical distribution state to verify the virtual workshop by executing the program" which is apparently a separate and distinct step of simulating as compared to the parent claim 2. In claim 2, "a simulating means of the computer receives settings of the adjustment conditions and the operating conditions and utilizes the information stored in the computer to simulate productivity during operation of the virtual workshop." The acts of "receiving settings" and "utilizing stored information" are apparently removed from, or at least obscured by the language of claim 6. Therefore the scope of claim 6 is indefinite.

7.   Claims 7-8 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 recites that the "simulating means simulates the production state and the physical distribution state". The parent claim 2 recites that the "simulating means" is used to "simulate productivity". It is unclear if Applicants' intend for these phrases to be synonymous. It is unclear if claim 7 should be interpreted as, for example, "repeating the steps of simulating to verify the virtual workshop when an arrangement of the facility of the workshop is changed," or if claim 7 describes the simulating means performing a different process.

Claim 8 is rejected for similar rationale directed to the same claim language.

8.   Claims 13, 15, and 16 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 13 recites, "storing in the computer information concerning structures of various production facilities and physical distribution facilities **of a workshop**" and also recites, "an **actual workshop constructed** according to the model of the virtual workshop so verified." Applicants' remarks submitted on 6 July 2006 state that, "In contrast, by way of non-limiting example, the claimed methods and systems could eliminate the need for such a prototype, since the process is validated **prior to construction of the workshop**, and the workshop is constructed in accordance with the verified virtual workshop." All emphasis is added.

For rationale similar to that set forth above regarding claim 2, the scope of claim 13 is indefinite. Applicants' remarks appear to interpret claim 13 as encompassing a method wherein "the process is validated prior to construction of the workshop" which does not appear to agree with the claim language.

Further, Applicants have submitted that claim 13 is directed to a "system," not a method. The Examiner acknowledges this point and respectfully suggests that claim language that is clearly directed to one of the four statutory categories of invention as set forth in 35 U.S.C. § 101 would significantly clarify the scope of patent protection sought in claim 13. It appears from the prosecution history that Applicants intend to avoid claim interpretation under 35 U.S.C. § 112, sixth paragraph. If this conclusion is in error, clarification is respectfully requested.

9.   Claim 15 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 15 recites a "link means for performing a link process" but fails to define what a "link process" means. It is therefore impossible to determine what does or does not constitute a "link means." The Examiner submits that the "remote monitoring unit" of claim 13 includes "link means" which performs a "link process" by comparing the production state and physical distribution state on the layout in the actual workshop with the production state and distribution state on the layouts that have been simulated by the simulating unit. Claim 15 does not appear to further limit the parent claim 13.

10.   Claim 16 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for

failing to particularly point out and distinctly claim the subject matter which applicant regards as

the invention.

Claim 16 merely recites an intended use for the system of claim 13. This claim language

does not further define the invention. Claim 16 will not be further treated on the merits.

11.   Claims 22, 23, and 25 are rejected under 35 U.S.C. § 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

Claim 22 recites, "**a plurality of production facilities**," "storing in the computer

information concerning the structures of various production facilities and physical distribution

facilities **of a workshop**," and also recites, "**an actual workshop** constructed to correspond to

the verified virtual workshop." Applicants' remarks submitted on 6 July 2006 state that, "In

contrast, by way of non-limiting example, the claimed methods and systems could eliminate the

need for such a prototype, since the process is validated **prior to construction of the workshop**,

and the workshop is constructed in accordance with the verified virtual workshop." All

emphasis is added.

For rationale similar to that set forth above regarding claim 2, the scope of claim 22 is

indefinite. Applicants' remarks appear to interpret claim 22 as encompassing a method wherein

"the process is validated prior to construction of the workshop" which does not appear to agree

with the claim language.

Further, like claim 13, claim 22 recites a "system". The Examiner respectfully suggests that claim language that is clearly directed to one of the four statutory categories of invention as set forth in 35 U.S.C. § 101 would significantly clarify the scope of patent protection sought in claim 13. It appears from the prosecution history that Applicants intend to avoid claim interpretation under 35 U.S.C. § 112, sixth paragraph. If this conclusion is in error, clarification is respectfully requested.

Claim 22 recites a "link means for performing a link process" but fails to define what a "link process" means. It is therefore impossible to determine what does or does not constitute a "link means." The Examiner submits that the "remote monitoring unit" of claim 22 includes "link means" which performs a "link process" by constructing an actual workshop that corresponds to the verified virtual workshop.

12.   Claim 25 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 25 merely recites an intended use for the system of claim 13. This claim language does not further define the invention. Claim 25 will not be further treated on the merits.

13.   Claim 26 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 26 is replete with either grammatical errors or indefinite language. While certain grammatical errors could normally be interpreted, the general state of the claim makes such an interpretation impossible. Among the issues under 35 U.S.C. § 112, second paragraph, are at least:

The preamble "A workshop-verifying system complex" provides little or no insight as to what statutory category of invention is being claimed. Clarification or correction is required.

The phrase "a virtual workshop system a virtual workshop system to verify a workshop, the virtual workshop system comprising" is circular and likely contains grammatical errors.

The phrase "a plurality of production facilities," "storing in the computer information concerning structures of various production facilities and physical distribution facilities of a workshop," "an actual workshop constructed to correspond to the verified virtual workshop," and Applicants' remarks submitted 6 July 2006 render the scope of the claim indefinite for rationale similar to that set forth above regarding claims 2, 13, and 22 for similar claim language.

The phrase "each facility being at least one dedicated equipment in which modular units are interchangeably fitted one at a time to a common process machine" is vague and indefinite. It is unclear if this language refers to "production facilities," "distribution facilities," or both. This language appears to be directed to an intended use of the "facilities" rather than "A workshop-verifying system complex."

The Examiner submits that, with speculation, the claim appears to define "A workshop-verifying system complex" as comprising "a virtual workshop system," "an actual workshop," and "a plurality of production facilities," each with their recited limitations. The Examiner respectfully requests clarification or correction regarding this interpretation.

Claim 26 will not be further treated on the merits.

Any claims rejected under 35 U.S.C. § 112, second paragraph, but not specifically

mentioned stand rejected by virtue of their dependence.

Claim Interpretation

14.   Claim 5 recites "wherein the simulating means obtains a quality of a product being

produced," which is interpreted as meaning "a distinctive attribute or characteristic," or

equivalent, that interpretation being a broad reasonable interpretation in light of the specification.

This interpretation is intended to contrast that in which "a quality" means "the degree of

excellence of something as measured against other similar things," for which no specific support

exists in the application as filed.

Applicants' response (6 July 2006, page 11) states:

> Regarding the Examiner's interpretation of claim 5, Applicants respectfully disagree. Applicants respectfully submit that the Specification does indeed support the meaning of quality as "the degree of excellence of something as measured against other similar things." E.g. at p. 8, lines 15-17, p. 28, lines 26-29, p. 40 [*presumed p. 30 –Examiner*], lines 13-15, and p. 40, lines 1-7.
> Applicants respectfully submit that one of ordinary skill in the art would interpret the word "quality" as used in the claims and Specification, to mean "the degree of excellence of something as measured against other similar things."

None of the portions of the specification cited by Applicants limits the definition of "a quality of

a product being produced" to "the degree of excellence of something as measured against other

similar things." Further, none of the portions of the specification cited by Applicants contradicts

that this phrase could be interpreted as "a distinctive attribute or characteristic."

Applicants' arguments are acknowledged but the Examiner maintains this interpretation

set forth above.

15.   Regarding claim 7, the claim is drafted in such a way that if the prior art does not show

"changing an arrangement of the facility of the workshop," the claim will be anticipated

regardless of the teachings in the prior art.

16.   Regarding claim 8, the claim is drafted in such a way that if the prior art does not show

"changing modular units," the claim will be anticipated regardless of the teachings of the prior

art. The claim language directed to the "production facilities" does not further define a method

step.

The claim interpretations given above <u>are not to be interpreted as endorsements</u> of claim

language that complies with 35 U.S.C. §§ 101 and 112. The claim interpretation merely express

the Examiner's understanding of what Applicants are seeking to patent in accordance with the

MPEP. These interpretations are made in order to apply prior art to the claims in the interest of

compact prosecution.

MPEP 2143.03 states:

> A claim limitation which is considered indefinite cannot be disregarded. If a claim is subject to more than
> one interpretation, at least one of which would render the claim unpatentable over the prior art, the
> examiner should reject the claim as indefinite under 35 U.S.C. 112, second paragraph (see MPEP §
> 706.03(d)) and should reject the claim over the prior art based on the interpretation of the claim that
> renders the prior art applicable. *Ex parte Ionescu*, 222 USPQ 537 (Bd. Pat. App. & Inter. 1984) (Claims on
> appeal were rejected on indefiniteness grounds only; the rejection was reversed and the case remanded to
> the examiner for consideration of pertinent prior art.). Compare *In re Wilson*, 424 F.2d 1382, 165 USPQ
> 494 (CCPA 1970) (if no reasonably definite meaning can be ascribed to certain claim language, the claim is
> indefinite, not obvious) and *In re Steele*, 305 F.2d 859,134 USPQ 292 (CCPA 1962) (it is improper to rely
> on speculative assumptions regarding the meaning of a claim and then base a rejection under 35 U.S.C. 103
> on these assumptions).

The prior art rejections to follow are based upon the Examiner's best attempt at interpreting the

claimed invention in light of the rejections under 35 U.S.C. § 112, second paragraph.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966),

that are applied for establishing a background for determining obviousness under 35 U.S.C. §

103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under

35 U.S.C. § 103(a), the examiner presumes that the subject matter of the various claims was

commonly owned at the time any inventions covered therein were made absent any evidence to

the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor

and invention dates of each claim that was not commonly owned at the time a later invention was

made in order for the examiner to consider the applicability of 35 U.S.C. § 103(c) and potential

35 U.S.C. § 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

17.   Claims 2, 5-8, 10, 11, 13, 15, 16, 22, 23, 25, and 26 are rejected under 35 U.S.C. § 103(a)

as being unpatentable over "Process Subsystem Architecture for Virtual Manufacturing

Validation" by J. Michael Griesmeyer and Fred J. Oppel, III (Griesmeyer).

         Griesmeyer teaches a workshop facility designing method comprising a virtual workshop

verifying process of formulating a virtual workshop that is a data model of an existing or newly

established workshop ["a process subsystem control architecture that facilitates *virtual*

manufacturing validation through the use of common control *software* to run *both the virtual and*

real subsystem." (abstract) See Figure 2 (page 2374) and Section 3.1.2 regarding the formulation

of a virtual workshop.];

         Regarding the step of storing several types of information, Griesmeyer clearly suggests to

a person of ordinary skill in the art the act of storing the requisite information to conduct the

simulation in a computer, such as *"In our approach, the production process consists of a series*

of parameterized process operations" (page 2371, right column), and inherent or implicit in

teachings such as *"Each of the assembly subsystems includes a robot, a set of grippers and*

appropriate algorithms for picking up various items on a pallet and placing them on other items

to construct the desired assembly" (page 2373, right column) and *"Configuration files tell the*

subsystem where items are initially on the pallets" (page 2737, right column).

         A simulating means that causes the virtual workshop to perform simulated production

activity [Section 3.2 for an example of simulated production activity, such as "For example, to

determine the 'pallet exists state' of the input port in the real environment requires the use of a

proximity sensor to detect the arrival of the pallet. To determine the same state in the *virtual*

environment requires the *simulation* to detect the arrival of the pallet utilizing collision routines. The virtual and real drivers generate the same type of state and event information."];

Virtual products are manufactured in the virtual workshop [*"Virtual validation of the assembly sequences for small electro-mechanical devices has been done through the use of the assembly subsystem control architecture described here."* (page 2375, right column)];

Production state, including production of the virtual products, production of virtual work in process, and distribution state, including flow of virtual work in process and flow of finished virtual products is monitored to thereby verify the virtual workshop [*"The virtual drivers for the assembly subsystem simulate the motion for all degrees of freedom in the system. This includes robot joint values, and gripper positions. The joint trajectory values are calculated using the routines available in the robot controller. Item locations are also modeled and are based on the attachment bookkeeping information..."* (page 2374, right column)];

A workshop development process of constructing an actual workshop including various layouts compatible with the virtual workshop so verified [Section 4, "The configuration files and the part tracking components of the assembly subsystem are verified together with the assembly sequence parameters using the virtual drivers to the primitives. Then, the *construction of the actual assemblies* are performed with the validated scripts using the real drivers."]

And a remote monitoring process of remote monitoring the production state and physical distribution state of the facilities in the layout employed in the actual workshop so constructed, and comparing the production state and the physical distribution state that have been monitored, with the productions state and the physical distribution state that have been simulated [Section 2.3, "The results of the *real primitive execution* need to be recorded and/or displayed to provide

record of manufacture and feedback to the process development efforts. Results of the *virtual*

execution must also be displayed and recorded for purposes of *virtual manufacturing*

validation."].

It is unclear whether Griesmeyer fails to disclose all of the claimed elements, however

the Examiner submits that the differences between the claimed invention and Griesmeyer would

have been obvious to a person of ordinary skill in the art at the time of Applicants' invention as

defined by 35 U.S.C. § 103 and *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966).

In response, Applicants argue primarily that:

> Contrary to the Examiner's assertion, Applicants respectfully submit that the above-noted section [Griesmeyer, §§ 3.1.1, 3.2, and 4] is not discussing the construction of the robotic assembly subsystem in the Advanced manufacturing Production System (AMPS). Instead, the assemblies discussed in the above noted section are the small electro-mechanical devices mentioned in the first sentence of section 4.
> [...] In other words, the simulation in Griesmeyer is simulation of a prior-constructed assembly system (the AMPS robotic assembly subsystem).
> Accordingly, Applicants respectfully submit that Griesmeyer neither discloses nor suggests "constructing an actual workshop including various facilities and layouts compatible with the verified virtual workshop," since the virtual validation described in Griesmeyer validates manufacturing processes to be run on an already-constructed real system using the software to control the real system in the simulation.

The Examiner respectfully traverses this argument as follows.

MPEP 2111.01 states:

> Although the specification discussed only a single embodiment, the court held that it was improper to read a specific order of steps into method claims where, as a matter of logic or grammar, the language of the method claims did not impose a specific order on the performance of the method steps, and the specification did not directly or implicitly require a particular order). See also paragraph III., below. There is one exception, and that is when an element is claimed using language falling under the scope of 35 U.S.C. 112, 6th paragraph (often broadly referred to as means or step plus function language). In that case, the specification must be consulted to determine the structure, material, or acts corresponding to the function recited in the claim. *In re Donaldson*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994) (see MPEP § 2181- § 2186).

Claim 2 recites, "storing in a computer information concerning various production

facilities and physical distribution facilities of an existing or newly established workshop having

a portion or the whole that is newly designed." Claim 2 also recites, "a workshop development

process of constructing an actual workshop including various facilities and layouts compatible

with the verified virtual workshop."

The Examiner submits that both "an existing ... workshop" and a "newly established

workshop" describe a workshop that, in some fashion, already exists. The claim does not recite,

for example, "a planned workshop".

The Examiner submits that the language "constructing an actual workshop including

various facilities and layouts compatible with the verified virtual workshop" is so broad that

what is excluded is not immediately apparent. The Examiner submits that this language does not

appear to establish a sequence for the method steps, in part because of the breadth of terminology

used. For example, it is unclear if it is possible to build an actual workshop, before verifying the

virtual workshop, such that the actual workshop is somehow *incompatible with* the verified

virtual workshop.

Applicants' argument appears to be founded on the allegation that Griesmeyer does not

teach the *sequence* of "verifying a virtual workshop" and subsequently "constructing an actual

workshop." The Examiner is unable to determine if the claim language supports this

interpretation, especially because the phrase "an existing or newly established workshop"

suggests that a workshop exists before the "virtual workshop verifying process" can proceed.

What is clear is that the claim refers to an *existing workshop* (an existing or newly established

workshop) and does not clearly set forth a specified sequence for the method steps.

There appears to be no controversy that Griesmeyer teaches a workshop (Advanced

Manufacturing Production System AMPS) that is *compatible with* the verified virtual workshop.

Whether the workshop comes before or after the act of verifying does not appear to be specified

by the claim.

Applicants' arguments have been fully considered but have been found unpersuasive.

Applicants further argue that:

> Further still, while the approach disclosed in Griesmeyer "makes it possible to reduce the number of real prototypes required to develop a validated manufacturing process," at best, the approach disclosed in Griesmeyer could reduce the required number of prototypes to one.
> In contrast, by way of a nnon-limiting example, the claimed methods and system could eliminate the need for such a prototype, since the process is validated prior to construction of the workshop, and the workshop is constructed in accordance with the verified virtual workshop.

The Examiner respectfully traverses this argument as follows.

As noted above, claim 2 makes reference to an *existing workshop* in order to perform the

"virtual workshop verifying process." Therefore the claim does not appear to support

Applicants' argument that "the process is validated prior to construction of the workshop."

Additionally, the claim does not recite that "the workshop is constructed in accordance with the

verified virtual workshop," but rather that the actual workshop is "compatible with" the verified

virtual workshop.

Lastly, it is unclear where in the Griesmeyer reference Applicants find support for the

argument.

Applicants' arguments have been fully considered but have been found unpersuasive.

Applicants further argue that:

Applicants respectfully submit that in the subject application, not production facilities, but a production state and a physical distribution state on layouts are verified. Accordingly, potential bottlenecks can be found. Applicants respectfully submit that such an advantage cannot be achieved by the system in Griesmeyer.

The Examiner respectfully traverses this argument as follows.

Finding potential bottlenecks is not recited by any claim. The prior art has been applied to the recited claim limitations.

Applicants' arguments have been fully considered but have been found unpersuasive.

Regarding claim 5, Griesmeyer teaches that the simulating means obtains a quality of a product being produced [*"A typical interaction is transport of material into the input port of the assembly subsystem. One state within this interaction is 'pallet exists in input port'."* (page 2375, right column)].

In response, Applicants argue primarily that:

> Applicants respectfully submit that Griesmeyer neither discloses nor suggests determining the quality of items produced in the virtual validation.

The Examiner respectfully traverses this argument as follows.

The claim specifies "wherein the simulating means obtains a quality of a product being produced." The term "quality" is extremely broad. As shown above, Griesmeyer teaches that the simulating means obtains a quality of the pallet, specifically its *existence*. There are several other examples in Griesmeyer of the simulating means "obtaining a quality of a product being produced."

Applicants' arguments have been fully considered but have been found unpersuasive.

Regarding limitations directed to changing the modular units or the arrangement of the facility, Griesmeyer teaches that the equipment has modular units that can be interchanged ["Thus, sub-operation primitives include *exchange of grippers*" (section 3, page 2374)].

Griesmeyer discloses that the equipment is arranged in a production line [Figure 2]. Further, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to reuse the method of Griesmeyer after making a change to the arrangement of the facility, especially in light of Griesmeyer's teachings [*"The approach makes it possible to reduce the number of real prototypes required to develop a validated manufacturing process."* (page 2371, left column)] and in light of the rather apparent observation that when a manufacturing process fails validation, a change should be made.

Regarding limitations for a step of transmitting data through a data communication means or a "link system" or "link means" is regarded as inherent or suggested in the computerized method of Griesmeyer, especially where simulation components interact (page 2375, section 3.2).

Regarding limitations regarding manufacturing a "mechanical component having a rolling element," this recitation does not distinguish the invention over the prior art according to MPEP 2111.02 because this limitation does not "[result] in a structural difference (or, in the case of process claims, manipulative difference) between the claimed invention and the prior art."

Applicants further argue that:

> Additionally, with respect to now-independent claim 22, Applicants respectfully submit that Griesmeyer neither discloses nor suggests a remote monitoring system that performs a remote maintenance in the actual workshop using information obtained from the remote monitoring.

The Examiner respectfully traverses this argument as follows.

Griesmeyer teaches (page 2375, left column):

> The motion display drivers provide three dimensional graphic views of the degrees of freedom of the assembly system. A motion display driver is required for every mechanical device that contains one or more degrees of freedom. The motion display drivers are automatically created during the software initialization from the mechanical description of the subsystem. After initialization, **the motion display drivers continuously monitor the movement of the mechanical device** until the subsystem is stopped. **The motion display drivers read the data from a buffer generated from the virtual or real device driver.** This data is then transferred to a graphical rendering package to display the motion of the device. **These motion display drivers are the same for both a virtual device and a real device.** (emphasis added)

The Examiner submits that this portion of Griesmeyer teaches a remote monitoring process. The motion display drivers continuously monitor the movement of the mechanical device, by reading data from a buffer generated by the real device driver, to (remotely) display the motion of the device.

Griesmeyer teaches "common control software" for the virtual and real subsystems (abstract). That is, the control software developed in the virtual subsystem is the same control software loaded into and executed by the real subsystem.

These teachings would suggest to a person of ordinary skill in the art that by using Griesmeyer's disclosed system, a person could remotely monitor the actual workshop, modify the "common control software" in response to a problem identified by remotely monitoring, and then loading that same "common control software" into the actual workshop equipment, thereby performing an act of maintenance.

Applicants' arguments have been fully considered but have been found unpersuasive.

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18.   Claims 2, 5-8, 10, 11, 13, 15, 16, 22, 23, 25, and 26 rejected under 35 U.S.C. § 103(a) as

being unpatentable over "Virtual Reality and Simulation" by Martin Barnes in view of

"Simulation in the Next Millennium" by Sanjay Jain.

Barnes teaches "Virtual Manufacturing", stating at pages 104-105, section 9.0 through

9.1, emphasis added:

"In the applications described below, VR worlds have been created that are 3D

and that realistically represent **existing or planned environments. The VR world is**

animated with behavior **controlled by a simulation engine which uses simulated**

behavior rules and model data...

"Visualization allows the user **to assemble components in a Virtual**

Manufacturing cell. This could be by utilizing the 3D models of the part designs using

popular CAD packages... Sikorsky used Deneb's IGRIP simulation software **to recreate**

the actual manufacturing process...

"Virtual Manufacturing modeling allows the user to introduce the

engineering design to the processes that will be used to create the actual part,

assembly, or installation. The tool design is imported to the model, combined with the

part and **dynamic representations of the machines that will produce the part.**

Machines such as 5-axis milling centers **or processes** such as aircraft joining **are**

programmed to operate identically in the virtual environment as they would in the

real environment... The ability to insert people in the environment and analyze

their activities minimizes ergonomic problems.

"**Factory modeling allows engineers to predict the cost and schedule impact of potential design or process changes.** The discrete process modeling tool, **QUEST, is used by Sikorsky to model the impact of machine run times, set up times, resource constraints, part lot quantity, and many other factors to develop a simulation that mirrors the entire manufacturing process under review**... The model provides support personnel with **a tool to optimize the manufacturing process**, try new concepts without disruption manufacturing, and predict changes due to load variations... The graphical interface allows the manufacturing experts to **actively participate in validating the model.**"

Barnes does not explicitly enumerate performing a maintenance operation or monitoring the actual workshop.

Jain teaches a "Virtual Factor", stating at pages 1481-1483, emphasis added, that:

"**A virtual factory is an integrated simulation model of major subsystems in a factory** that considers the factory as a whole and **provides an advanced decision support capability** (Jain et al. 1998). It mimicks the real life operations of the factory. **Realistic 3D visualization of the factory can be build in the virtual factory, if needed for example for visualizing a future green field factory.**

... With advancements in computing technology it is feasible to create a virtual factory, that models the major aspects of the factory in an integrated way... It is envisaged as a major capability that can support rapid development and efficient operation of manufacturing systems throughout the lifecycle.

At the design stage, the virtual factory can be used to ensure that the manufacturing system and sub-system designs when implemented will meet the requirements...

At the installation stage, a virtual factory will be used to ensure that the equipment as built, installed and integrated meets the design and, in turn, the requirements. It is expected the virtual factory component models used for design stage validation will also be used to conduct installation stage validation through stepwise replacement of simulated components with physical components.

The role of a virtual factory during operations becomes threefold. **First, it can serve to ensure that a validated manufacturing system continues to meet its requirements over prolonged periods of time. Second, the virtual factory can be used to support continuous improvement changes, which will go through a concept-design-installation cycle of their own.** Third, the virtual factory can be used as an application itself. For example, simulation based planning and scheduling solutions can be built using the virtual factory models.

Barnes and Jain are analogous art because both are drawn to simulation.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the monitoring and maintenance teachings of Jain with the virtual manufacturing teachings of Barnes.

Motivation to combine is found throughout the Jain reference, for example, "to support continuous improvement changes" (page 1483, left column, third paragraph).

Therefore it would have been obvious to a person of ordinary skill in the art to combine the teachings of Barnes and Jain to arrive at the invention specified in claims 2, 5-8, 10, 11, 13, 15, 16, 22, 23, 25, and 26.
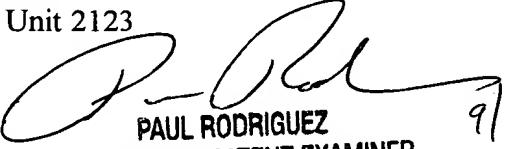
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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